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Attorney Docket # 4925-57 Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of
Petri JOLMA et al.
Serial No.: 09/658,731
Filed: September 11, 2000
For: System and Method For Slot Allocation With Reduced Need For Measurement

Examiner: Rampuria, Sharad K.
Group Art: 2683

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Alfred W. Froebrich
Name of applicant, assignee or Registered Representative

Signature

July 1, 2004
Date of Signature

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APPEAL BRIEF

SIR:

This is an appeal, pursuant to 37 C.F.R. §1.192(a) from the decision of the Examiner in the above-identified application, as set forth in the Final Office Action mailed October 2, 2003 wherein the Examiner finally rejected appellant's claims. The rejected claims are reproduced in the Appendix A attached hereto. A Notice of Appeal was filed on Aril 5, 2004. This Appeal Brief is being submitted in triplicate.

The fee of $330.00 for filing an Appeal Brief pursuant to 37 C.F.R. §1.17(f) is submitted herewith. Appellants requests a one-month Extension of Time of the original shortened statutory response period to file this Appeal Brief. A Petition for the one-month extension of time is

enclosed herewith along with the fee of $110. Any additional fees or charges in connection with this application may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

REAL PARTY IN INTEREST

The assignee, Nokia Networks Oy, of applicants, Petri Jolma, Kalle Passoja, Otto Lehtinen, and Petri Patronen, is the real party of interest in the above-identified U.S. Patent Application.

RELATED APPEALS AND INTERFERENCES

There are no other appeals and/or interferences related to the above-identified application at the present time.

STATUS OF CLAIMS

The application was filed with claims 1-14. Claims 1 and 8 were amended during prosecution by an amendment filed July 28, 2003. All of the claims were finally rejected in a final Office Action mailed October 2, 2003. Claims 1-14 are on appeal.

STATUS OF AMENDMENTS

An Amendment was filed on subsequent to the Final Office Action on March 2, 2004. In response, the Examiner issued an Advisory Action dated March 29, 2004 which stated that the amendment was considered but does not place the application in condition for allowance. The Examiner did not specifically state whether the amendment was entered. We will assume that the amendment filed March 2, 2004 was not entered.

SUMMARY OF THE INVENTION

Appellants' invention is directed to a system and method for the dynamic apportionment of channels in a multiplexed radio system. According to the invention, a communication system 10 includes multiple base stations (BSs) 2 controlled by a controller 6 (see Fig. 1; and page 7, lines 11-16). The BSs 2 are multiplexed using time-division duplex (TDD) (page 7, lines 17-20). Each BS 2 employs a plurality of time slots, i.e., channels, for communicating with mobile terminal 4 (page 7, lines 20-21). Some of the BSs coverage areas may overlap so that the slots or channels of the BSs of the overlapping areas interfere with each other (page 8, lines 1-4). In the example described in the specification, the system 10 includes ten BSs 2-1 through 2-10 and each BS 2 employs 15 time slots (page 7, lines 13-14 and 20-21).

Based on a current assessment of which BSs are interfering with each other, the slots of each BS are assigned as one of owned, shared, or avoided (page 8, lines 5-6). If a slot or channel is owned by a first base station, the same slot is assigned as avoided by adjacent base stations which are assessed as interfering with the first base station (page 8, lines 6-10). Slots that are not owned or avoided, are assigned as shared by each interfering base station (page 8, line 10). Thus, the channels or time slots of each BS are assigned a classification according to the probability of interference.

When a user requests the initiation of communication with BS 2 using a mobile terminal 4, the BS must allocate a channel or slot for the communication (page 8, lines 11-12). The slot or channel to be used is determined by measuring path loss and interference at various slots or channels until a suitable slot or channel is found (page 8, lines 12-14). According to the present invention, the first slots or channels to be tried are slots or channels that are owned and not already

in use (page 8, lines 14-15). If none of the owned slots or channels can be used, then the shared slots or channels are tried (page 8, line 20 to page 9, line 4). When quality of service (QoS) is taken into account, communications requiring high quality start measuring slots or channels that are owned (page 9, lines 10-11). Communications which to not require a high quality class start measuring slots or channels assigned as shared, which allows the owned slots or channels to remain available for transmissions requiring high quality class transmissions (page 9, lines 12-14).

ISSUES

1. Whether claims are patentable under 35 U.S.C. 103 over U.S. Patent No. 5,831,976 (Lin) in view of U.S. Patent No. 5,361,258 (Arnold)?

GROUPING OF CLAIMS

The pending claims are 1-14, of which claims 1 and 8 are independent. The claims are grouped as follows:

Group I -- claims 1-14, which stand or fall together.

ARGUMENT

GROUP I (CLAIMS 1-14)

Independent claims 1 and 8

It is respectfully submitted that neither Lin nor Arnold disclose, teach or suggest the limitations "predetermining, for each base station, a classification for each channel according to the probability of interference at the channel with other base stations of the plurality of base stations",

"allocating on request a channel according to the predetermined classification and a desired quality class of transmission", as expressly recited in independent claims 1 and 8.

Lin discloses a method and apparatus for time sharing a radio channel (col. 4, lines 47-55). Lin discloses that each cell 302 of a radio communication system 300 is assigned to a virtual channel wherein each virtual channel is activated for one or more time slots of a frame cycle of a transmission protocol, and only one virtual channel is allowed to be active during any given time slot (col. 6, lines 4-14 of Lin). The cells 302 assigned to one virtual channel are selected to that they can carry simultaneous transmissions without excessive interference (col. 6, lines 6-10). More specifically, the cells assigned to one virtual channel are separated geographically to reduce interference (Fig. 4; and col. 6, lines 17-20). If the traffic load of one virtual channel V1 is greater than the traffic load of another virtual channel V2, the virtual channel V1 will be activated in a greater number of time slots than the virtual channel V2 during each frame cycle (col. 6, lines 42-51). Accordingly, Lin assigns virtual channels to time slots based on estimated load. Lin does not predetermine a classification of each base station for each channel. Rather, Lin assigns a base station to one virtual channel, which is assigned to time slots based on estimated load. Furthermore, Lin fails to disclose, teach or suggest that a channel is allocated based on the classification and a desired quality class of transmission.

Arnold fails to teach or suggest what Lin lacks. Arnold discloses a beacon detection system for sharing spectrum between two separate communication systems, i.e., a wireless communication system and a fixed microwave system. Fig. 1 of Arnold discloses a wireless communication system 5 with base stations (ports) and mobile transceivers (portable). Through time division multiple access (TDMA), each portable can access the port (see col. 10, lines 54-63 of

Arnold). Fig. 2 of Arnold shows a situation in which the ports and portables of the wireless communication system share frequency spectrum with a point-to-point microwave system. The microwave system includes towers 201, 202 which communicate at frequencies f_{R1} and f_{R2} (col. 12, lines 45-53). To share the spectrum with the microwave system, the ports and portables of the wireless communication system cannot transmit at those frequencies (col. 13, lines 1-7). To avoid interference, each tower of the microwave system transmits a beacon signal to protect its corresponding receiver frequency (col. 13, lines 7-11). The avoidance of a signal from another system fails to teach or suggest the recitations "predetermining, for each base station, a classification for each channel according to the probability of interference at the channel with other base stations of the plurality of base stations" as expressly recited in independent claims 1 and 8. The claim clearly recites that the plural base stations are the base stations of a communication system for communicating with at least one mobile station. More specifically, the claims predetermine the classification based on intra-system interference.

The Examiner states in the Office Action that col. 12, lines 45-67 and col. 13, lines 1-42 of Arnold discloses the step of predetermining, for each base station, a classification for each channel according to the probability of interference at the channel with other base stations of the plurality of base stations. However, these portions of Arnold disclose only that the antennas of the microwave system transmit beacon signals which are received by the ports and portables of the wireless communication system so that the ports and portables can avoid using those frequencies used by the microwave system. Accordingly, Arnold does not teach or suggest determining interference with other base stations within the same communication system. Rather, Arnold teaches avoiding interference between two separate communication systems.

Furthermore, Arnold does not disclose assigning channels based on a desired quality class of transmission, as expressly recited in independent claims 1 and 8. According to Arnold, the channel either interferes with the other system or does not interfere with the other system, i.e., either cannot or can be used. Within the wireless communication system of Arnold, there is no allocation of channels based on a desired quality class of transmission.

For the foregoing reasons, it is respectfully submitted that the combined teachings of Lin and Arnold fail to establish a *prima facie* case of obviousness with regard to the subject matter recited in claims 1 and 8. The Final Rejection of the claims in Group I should be reversed.

Dependent claim 3 and 10

Independent claims 3 and 10 further recite assigning a channel as owned, avoided, or shared by a base station.

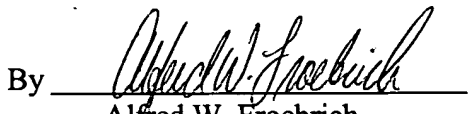
Lin discloses that each base station is assigned to only one virtual channel and that each time slot of a time frame is assigned to only one virtual channel (col. 6, lines 10-14). Accordingly, a channel is never considered to be shared by two different interfering base stations. Col. 13, lines 15-25 of Arnold describes that a frequency, i.e., a channel, can either be used or not used by a mobile terminal based on whether that channel is being used by a microwave system. Accordingly, Arnold also fails to teach or suggest that a channel can be shared by two interfering base stations.

For the foregoing reasons, it is respectfully submitted that the combined teachings of Lin and Arnold fail to establish a *prima facie* case of obviousness with regard to the subject matter recited in claims 3 and 10. The Final Rejection of the claims 3 and 10 should be reversed for at least these additional reasons.

CONCLUSION

For the foregoing reasons, it is respectfully submitted that appellants' claims are not rendered obvious by Lin and Arnold and are, therefore, patentable over the art of record, and the Examiner's rejections should be reversed.

Respectfully submitted,
COHEN, PONTANI, LIEBERMAN & PAVANE

By 

Alfred W. Froebrich
Reg. No. 38,887
551 Fifth Avenue, Suite 1210
New York, New York 10176
Tel (212) 687-2770

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APPENDIX

1. (previously presented) A method of allocating communication channels in a communication system comprising a plurality of base stations each for communicating with at least one mobile station, the base stations capable of communicating via any of a predetermined group of channels, and some of the base stations being susceptible of being interfered with by other of the base stations in some of the channels of said group of channels, the method comprising the steps of:

predetermining, for each base station, a classification for each channel according to the probability of interference at the channel with other base stations of the plurality of base stations; and

allocating on request a channel according to the predetermined classification and a desired quality class of transmission.

2. (original) The method of claim 1, wherein each said channel is a time slot.

3. (original) The method of claim 1, wherein said predetermination comprises:

assigning as owned by said each base station and as avoided by said other base stations a channel in which said other base stations interfere with said each base station;

assigning as owned by said other base stations and as avoided by said each base station remaining channels in which said other base stations interfere with said each base station; and

assigning as shared by said each base station and said other base station channels in which said other base stations interfere with said each base station if used simultaneously with said each base station and which are not assigned as owned by either.

4. (original) The method of claim 1, wherein:

the communication system further includes a controller connected to each base station;

said predetermination for each base station is reported to the controller; and

said allocating is performed in the controller.

5. (original) The method of claim 3, wherein:

the communication system further includes a controller connected to each base station;

said predetermination for each base station is reported to the controller;

said allocating is performed in the controller; and

the controller maintains an indication of which channels are currently allocated for each base station.

6. (original) The method of claim 5, wherein:

if neither an owned channel nor a shared channel of a first base station is available for a requested communication, the controller determines whether any avoided channel of the first base station is not in use by a second base station owning that channel, and if so, that channel is allocated for the requested communication.

7. (original) The method of claim 2 wherein the step of allocating is further according to location of a mobile station to be communicated with.

8. (previously presented) Apparatus for allocating communication channels in a communication system comprising a plurality of base stations each for communicating with at least one mobile station, the base stations capable of communicating via any of a predetermined group of channels, and some of the base stations being susceptible of being interfered with by other of the base stations in some of the channels of said group of channels, the apparatus comprising a logic unit configured to:

predetermine, for each base station, a classification for each channel according to the probability of interference at the channel with other base stations of the plurality of bases stations; and

allocate on request a channel according to the predetermined classification and a desired quality class of transmission.

9. (original) The apparatus of claim 8, wherein each said channel is a time slot.

10. (original) The apparatus of claim 8, wherein said logic unit is configured to perform said predetermination by:

assigning as owned by said each base station and as avoided by said other base stations a channel in which said other base stations interfere with said each base station;

assigning as owned by said other base stations and as avoided by said each base station remaining channels in which said other base stations interfere with said each base station; and

assigning as shared by said each base station and said other base station channels in which said other base stations interfere with said each base station if used simultaneously with said each base station and which are not assigned as owned by either.

11. (original) The apparatus of claim 8, further comprising a controller connected to each base station and configured to:

receive said predetermination for each base station is reported to the controller; and

to be a portion of said logic unit for performing said allocating.

12. (original) The apparatus of claim 11, wherein the controller maintains an indication of which channels are currently allocated for each base station.

13. (original) The apparatus of claim 12, wherein:

if neither an owned channel nor a shared channel of a first base station is available for a requested communication, the controller is configured to determine whether any avoided channel of the first base station is not in use by a second base station owning that channel, and if so, to allocate that channel for the requested communication.

14. (original) The apparatus of claim 9, wherein the logic unit is configured to allocate a channel further according to location of a mobile station to be communicated with.